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CASE REPORT

Recurrence of primary aldosteronism after percutaneous ethanol injection

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KEYWORDS

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Adrenalectomy is the definite treatment for aldosterone-producing adenoma (APA). Percutaneous ethanol or acetic acid injection with computed tomography (CT) guidance has been described as a safe, noninvasive, and effective alternative treatment modality in patients with high surgical risk. We report on a man who was 49 years of age and presented with treatment-resistant hypertension and was later diagnosed with APA. CT-guided percutaneous ethanol injection (PEI) was performed for this high surgical risk patient. He had aldosteronism recurrence 4 years after the ethanol injection, so a second PEI was performed. The tumor size was reduced and his blood pressure was normalized. Therefore, we suggest that clinicians should closely check aldosterone to renin ratio and potassium level if percutaneous chemical ablation is considered in functioning adrenal adenomas.

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Introduction

Primary aldosteronism (PA), characterized by increased aldosterone secretion from the adrenal glands, has been increasingly recognized.¹ Identification of aldosterone-producing adenoma (APA), the surgically curable form of secondary hypertension, is of paramount importance.^{1–4} In

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previous reports, percutaneous chemical ablation with either acetic acid or ethanol for the treatment of APA was considered as an effective modality for the nonsurgical candidate.⁵ In this report, we first describe a patient with adenoma recurrence 4 years after the percutaneous ethanol injection (PEI). We suggest that intense follow-up should be mandatory after PEI; a second PEI is also effective for the recurrence.

Case report

A man 49 years of age with treatment-resistant hypertension and intracranial hemorrhage was investigated for secondary hypertension. Low potassium level and an elevated aldosterone to renin ratio (ARR) made the PA likely [plasma aldosterone concentration (PAC) 85.5 ng/dL, plasma renin activity (PRA), 0.16 ng/mL/hr and ARR, 534.4]. An abdominal computed tomography (CT) showed a 1-cm tumor at the right adrenal gland with Stanford type II aortic dissection. An adrenal venous sampling (AVS) revealed the lateralization of aldosterone hypersecretion. CT-guided percutaneous ethanol injection (PEI) with 10 mL of 99.8% ethanol to adrenal adenoma was thus performed for the safety of aortic dissection. In the following 3 years, the patient's blood pressure was kept normotensive with spironolactone use. He had normal serum potassium level and ARR < 35.

Four years after the PEI, the patient's systolic blood pressure elevated to higher than 160 mmHg. The positive plasma ARR measurement and saline infusion test confirmed the diagnosis of PA again. The saline infusion test was performed with intravenous infusion of 2 L of 0.9% saline for 4 hours. The serum aldosterone before and after saline infusion were 93.9 and 65.5 ng/dL, respectively. The abdominal CT revealed a 1.2-cm, hypodense tumor at the right adrenal gland (Fig. 1). The second PEI was performed (Fig. 2), which treated the patient's hypertension and normalized his ARR. Follow-up abdominal magnetic resonance imaging showed a reduced tumor size (Fig. 3).

Discussion

In recent reports,^{3,4} the prevalence of primary aldosteronism in the newly diagnosed hypertension has exceeded 10%, with 4.8% of surgically curable APA. Aldosterone itself is a cardiovascular risk, making the accurate diagnosis of



Figure 1 The computed tomography scan revealed a hypodense tumor at the right adrenal gland (arrow) 4 years after the first percutaneous ethanol injection.

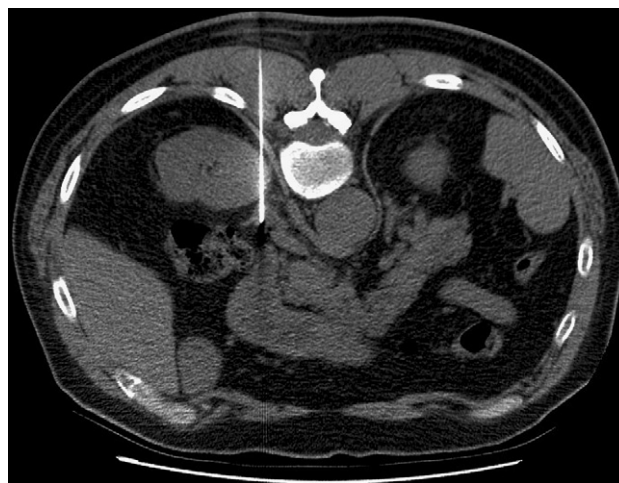


Figure 2 The second computed-tomography-guided percutaneous ethanol injection.

APA and timely surgery more important. The Endocrine Society Clinical Practice Guidelines⁵ recommend unilateral laparoscopic adrenalectomy in patients with documented unilateral PA and medical treatment with a mineralocorticoid receptor (MR) antagonist in patients unable or unwilling to undergo surgery. Less invasive techniques, including radiofrequency ablation (RFA), transcatheter arterial embolization (TAE), and chemical ablation (injection of ethanol or acetic acid) have been described as alternative modalities for the nonsurgical candidate.⁵

PEI has been widely used in small hepatocellular carcinoma (HCC), and the survival rates of surgical resection and PEI are comparable.⁶ The application of PEI in nodular lesion of endocrine glands, including thyroid, parathyroid, and adrenal glands, has also been proposed.⁶ A retrospective study evaluated the effectiveness of CT-guided percutaneous chemical ablation of adrenal neoplasms under CT guidance.⁷ Of the seven patients with PA, all reached the normal range of serum potassium level, PAC,

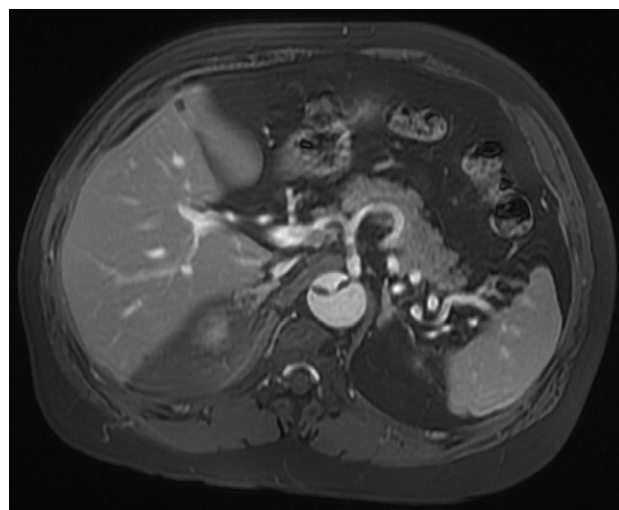


Figure 3 The T1-weighted image of abdominal magnetic resonance imaging showed a contracted tumor.

and PRA during the first 2 years. Percutaneous chemical ablation may be a good method in patients with high surgical risk. Ethanol and acetic acid are the most commonly agents used for chemical ablation.^{6,7} The mechanism of action is cytoplasmic dehydration followed by coagulation necrosis, fibrous reaction, and microvascular thrombosis. The difference is that the ethanol has difficulty in penetrating tumor septa well and is used in small tumors (<3 cm). In achieving the same degree of tumor damage, a larger volume of ethanol is needed. However, the patients experienced less abdominal pain with ethanol injection compared with acetic acid.⁷ In the previous report,⁶ percutaneous acetic acid injection (PAI) for primary aldosteronism attributable to APA has a good outcome with a mean follow-up period of 42.4 months.⁶ Ethanol was chosen in our patient for a small adrenal tumor.

Our patient had aldosteronism recurrence 4 years after the PEI. Although PEI has been a noninvasive, simple, and cost-effective treatment for small functional adrenal cortical tumors, the role of surgical adrenalectomy in adrenal neoplasms cannot be replaced.⁵ If surgery is not feasible or suitable, more efficient chemical agents such as acetic acid may be considered for chemical ablation with intensive follow-up. With evidence of adenoma recurrence during the follow-up period,⁸ it was mandatory and effective to perform the second injection. Our case is the first report to show the effectiveness of repeated PEI in control of APA if an alternative strategy, except adrenalectomy, is indicated.

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